14. (New) The electronic device of claim 12, wherein the electrode layer comprises Al and is reflective.

REMARKS

This is in response to the Office Action dated October 4, 2002. Claim 6 has been canceled. New claims 11-14 have been added. Thus, claims 1-5 and 7-14 are pending. Attached hereto is a marked-up version of the changes made to the abstract and claim(s) by the current amendment. The attached page(s) is captioned "**Version With Markings To Show Changes Made.**"

The abstract has been amended as requested by the Examiner.

Initially, it is noted that applicant has not yet received an initialed copy of the PTO-1449 corresponding to the IDS filings of October 26, 2000 and October 1, 2002. Thus, it is respectfully requested that the Examiner confirm that these IDSs have been considered by providing the undersigned with an initialed copy of the PTO-1449s corresponding to the same.

For purposes of example, and without limitation, certain example embodiments of this invention relate to a technique for *improving adherence of a reflective pixel electrode in a liquid crystal display (LCD) to an underlying insulating layer.* As shown in Fig. 2A of the instant specification for example, the LCD includes a TFT 43, interlayer insulating film 44, molybdenum nitride (MoN) film 45 and conductive reflective pixel electrode 46 (e.g., made of Al) which defines at least part of a pixel of the LCD. Surprisingly, it has

been found that the use of MoN for layer 45 enables improved adhesion between the reflective pixel electrode 46 and interlayer insulator 44 thereby resulting in better yields. Surprisingly, reduction of electrolytic corrosion is also achieved due to the MoN under the reflective LCD pixel electrode.

Claims 1, 2, 4, 6, 7, 9 and 10 stand rejected under 35 U.S.C. Section 112, second paragraph. It is respectfully submitted that changes made to these claims herein address and overcome any potential issue in this respect.

Claim 1 Art Rejection

Claim 1 stands rejected under 35 U.S.C. Section 102(e) as being allegedly anticipated by Kurogane (US 5,831,281). This Section 102(e) rejection is respectfully traversed for at least the following reasons.

Claim 1 requires "a film comprising molybdenum nitride formed immediately below and in contact with the reflective pixel electrode, and above and contacting the interlayer insulator, so that the film comprising molybdenum nitride is at least partially located between and contacting each of the reflective pixel electrode and the interlayer insulator." For example, Fig. 2A of the instant application illustrates molybdenum nitride (MoN) film 45 located below reflective pixel electrode 46 and above interlayer insulator 44, wherein the MoN 45 is at least partially located between and contacting each of the reflective pixel electrode 46 and the interlayer insulator 44. As explained above, in certain example embodiments of this invention, the use of MoN directly between and contacting the reflective pixel electrode 46 and the insulator 44 surprisingly enables

adhesion of the reflective pixel electrode to the insulator to be improved. The cited art fails to disclose or suggest the aforesaid quoted and underlined aspect of claim 1.

Kurogane merely uses MoN on a source/drain electrode of a TFT. For example, the front page of Kurogane illustrates that MoN 9 is provided on the surface of a TFT source/drain electrode 8. Kurogane uses the MoN to minimize etching shift so as to enhance reliability of the source/drain lines (col. 5, lines 28-35).

Thus, it can be seen that Kurogane fails to disclose or suggest providing a layer comprising MoN directly between and contacting an LCD's reflective pixel electrode and an underlying insulating layer, as required by claim 1. In other words, Kurogane fails to disclose or suggesting providing a MoN layer directly between Kurogane's pixel electrode 13 and insulating layer 11 as required by claim 1. Kurogane instead teaches directly away from this by using MoN at a completely different location (on the source/drain), and intentionally does not use MoN at the location above layer 11 as required by claim 1. Kurogane is thus entirely unrelated to the invention of claim 1, and cannot possibly anticipate or otherwise render the same unpatentable.

Moreover, there is nothing in the art of record which would have led one of ordinary skill to have placed MoN between Kurogane's pixel electrode 13 and insulating layer 11 as required by claim 1. The fact that Kurogane uses MoN at a completely different location, and not between layer 11 and pixel electrode 13, teaches that the invention of claim 1 is clearly not obvious.

Claim 7 Art Rejection

Claim 7 stands rejected under 35 U.S.C. Section 103(a) as being allegedly unpatentable over Mitsui (US 5,408,345) in view of Kurogane (discussed above). This Section 103(a) rejection is respectfully traversed for at least the following reasons.

Claim 7 requires that a "laminated layer comprises an insulating film and a film comprising molybdenum nitride laminated to and over at least part of the insulating film, so that the film comprising molybdenum nitride contacts the insulating film, wherein the insulating layer is located at least partially over address lines of the liquid crystal display; and a reflective metal film having a light reflecting function and provided in at least one pixel region of the display for contributing to displaying of images in the display, wherein the reflective metal film is formed on the laminated layer so as to contact the film comprising molybdenum nitride." In other words, claim 7 requires that (a) the MoN be located over at least part of an insulating film, which insulating film is located "over" address lines of the LCD; and (b) a reflective metal film for contributing to image display is formed on the laminated layer so as to contact the MoN. For example, see Fig. 2A of the instant application which illustrates that insulating layer 44 is located over address lines of the LCD, and that both reflective metal film 46 for contributing to image display and MoN 45 are both located over the insulating layer 44. The cited art fails to disclose or suggest the aforesaid quoted and underlined aspect of claim 7.

Mitsui in Figs. 5-6 discloses a reflective LCD including Al or Mo source address lines 39 (and source electrodes 36), gate address lines 32, reflective pixel electrodes 38 of Al, and interlayer insulator 42. There is no ITO in connection with reflective pixel electrodes 38 of Mitsui. The Office Action *admits* that Mitsui fails to disclose or suggest

the claimed MoN at a location between reflective metal film (reflective pixel electrode) 38 and insulating layer 42.

Recognizing this deficiency in Mitsui, the Office Action cites Kurogane. The Office Action contends that it would have been obvious to have placed Kurogane's MoN into the structure of Mitsui directly between Mitsui's reflective pixel electrode 38 and insulator 42. The Office Action contends that this would have been obvious "in order to prevent corrosion that occurs during deposition of an ITO film at the contact hole . . . ." However, the Office Action has clearly misinterpreted Misui and Kurogane in many respects.

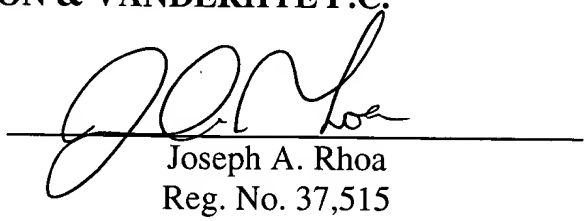
There is no ITO in Mitsui's contact hole 43. Moreover, one of ordinary skill in the art would never have filled Mitsui's contact hole 43 with ITO, because ITO is transparent and the pixel electrode in Mitsui must be reflective for the display to work. One of ordinary skill in the art would never have replaced Mitsui's reflective Al pixel electrode 38 with ITO, because ITO is transparent and would render Mitsui's reflective type LCD inoperative. Thus, the Office Action's allegation that it would have been obvious to have placed MoN between Mitsui's reflective electrode 38 and insulator 42 "in order to prevent corrosion that occurs during deposition of an ITO film at the contact hole" is entirely incorrect (Mitsui has no ITO in the contact hole, or otherwise in contact with electrode 38) and cannot possibly be used for a basis of the alleged Section 103 combination. Because Mitsui does not use ITO in the contact hole, this alleged reason for the Section 103 combination is clearly incorrect. The Section 103 combination is unsupported and should be withdrawn.

Furthermore, the alleged Section 103(a) rejection is incorrect for a number of other reasons. First, Kurogane's teaching for combining Al and Mo is in the context of address lines – not pixel electrodes of an LCD. Second, a primary reason why Kurogane uses Mo is to "suppress the occurrence of Al bumps, i.e., hillocks or whiskers" (col. 1, lines 46-51). In contrast to this, Mitsui expressly desires Al bumps in reflective Al pixel electrodes 38 in order to enhance reflective LCD characteristics (see Fig. 5 of Mitsui). Thus, Mitsui desires that bumps/hillocks in its Al; whereas Kurogane uses Mo to "suppress" or eliminate such bumps. Accordingly, one of ordinary skill in the art would never have used Kurogane's Mo in Mitsui because Mitsui expressly desires bumps in its Al reflective pixel electrodes 38; and the reason which Kurogane uses Mo is to eliminate such bumps which are clearly desired in Mitsui. Again, the Section 103(a) rejection is fundamentally flawed and cannot be sustained.

For at least the foregoing reasons, it is respectfully requested that all rejections be withdrawn. All claims are in condition for allowance. If any minor matter remains to be resolved, the Examiner is invited to telephone the undersigned with regard to the same.

Respectfully submitted,

NIXON & VANDERHYE P.C.

By: 

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VERSION WITH MARKINGS TO SHOW CHANGES MADE

IN THE ABSTRACT

ABSTRACT OF THE DISCLOSURE

A thin film transistor (TFT) is formed on an insulating substrate, and a photosensitive resin film as an interlayer insulating film is formed so as to cover the TFT. [A first photomask and/or a second photomask provided with scattered circular light-shielding portions are used to perform two exposure so that contact]Contact holes are formed in the photosensitive resin, and smooth concave and convex portions are provided on an upper surface of the resin. [in regions other than the TFT. Further, an MoN film] A film including molybdenum nitride (MoN) and a reflective pixel electrode film are successively laminated on the photosensitive resin. The [N2]nitrogen content in the MoN film [is made]may be between 5 atomic % and 30 atomic % inclusive so that the MoN film can obtain strong adhesion to the photosensitive resin and prevent or reduce decrease in the etching rate of the MoN film.

IN THE CLAIMS

Please cancel claim 6.

1. (Amended) A [patterned substrate] liquid crystal display (LCD) comprising:

at least one thin film transistor (TFT), an interlayer insulator, and at least one reflective [metal film]pixel electrode defining at least part of a pixel of the LCD and being supported by a substrate, [an insulating film adjacent to the metal film]wherein the

interlayer insulator is located at least partially between the reflective pixel electrode and the substrate, and

a film comprising molybdenum nitride [film] formed [at least on a side of the metal film which is in contact with the insulating film]immediately below and in contact with the reflective pixel electrode, and above and contacting the interlayer insulator, so that the film comprising molybdenum nitride is at least partially located between and contacting each of the reflective pixel electrode and the interlayer insulator.

2. (Amended) The [patterned substrate]LCD according to claim 1, wherein [the metal film forms an electrode]the reflective pixel electrode comprises aluminum (Al).

3. (Amended) The [patterned substrate]LCD according to claim 1, wherein the film comprising molybdenum nitride [film] has a nitrogen content between 5 atomic % and 30 atomic %[inclusive].

4. (Amended) The [patterned substrate]LCD according to claim 1, wherein the [insulating film also serves as a support substrate]interlayer insulator comprises a photosensitive resin.

5. (Amended) The [patterned substrate]LCD according to claim 1, wherein the insulating film [is composed of]comprises a polymeric resin.

7. (Amended) A liquid crystal display comprising:

a pair of substrates,

a liquid crystal layer [interposed] between the pair of substrates,

a laminated layer provided on at least one of the substrates, wherein the laminated layer [is formed by laminating]comprises an insulating film and a film comprising molybdenum nitride [film on the substrate]laminated to and over at least part of the insulating film, so that the film comprising molybdenum nitride contacts the insulating film,

wherein the insulating layer is located at least partially over address lines of the liquid crystal display; and

a reflective metal film having a light reflecting function and provided in at least one pixel region[s obtained by dividing the liquid crystal layer into a plurality of segments] of the display for contributing to displaying of images in the display, wherein the reflective metal film is formed on the laminated layer so as to contact the film comprising molybdenum nitride.

8. (Amended) The liquid crystal display according to claim 7, wherein the film comprising molybdenum nitride [film] has a nitrogen content between 5 atomic % and 30 atomic %[inclusive].

9. (Amended) The liquid crystal display according to claim 7, wherein the reflective metal film [serves as an]is a pixel electrode for applying a voltage to the liquid crystal layer.

10. (Amended) The liquid crystal display according to claim 7, [wherein an]further comprising an electrode comprising indium-tin oxide (ITO) [film is] formed on [a side of a] the same substrate on which the reflective metal film is formed, wherein the film comprising molybdenum nitride is provided at least partially between the reflective metal film and the electrode comprising ITO.

Please add the following new claims:

11. (New) A liquid crystal display (LCD) comprising:

at least one thin film transistor (TFT),

an insulating layer at least partially provided over address lines of the LCD, at least some of said address lines being in communication with the TFT;

at least one reflective pixel electrode defining at least part of a pixel of the LCD; and

a film comprising molybdenum in direct contact with the under-side of said reflective pixel electrode, so that the film comprising molybdenum is in directly contact with the under-side of the reflective pixel electrode and an upper surface of the insulating layer.

12. (New) An electronic device comprising:

a substrate supporting an insulating layer and a conductive electrode layer; and

a layer comprising molybdenum nitride located between and contacting each of the insulating layer and the conductive electrode layer, wherein the layer comprising molybdenum nitride is located below the conductive electrode layer and above the insulating layer so that the insulating layer is between the substrate and the layer comprising molybdenum nitride.

13. (New) The electronic device of claim 12, further comprising a plurality of TFTs on the substrate, wherein the insulating layer is formed at least partially over the TFTs.

14. (New) The electronic device of claim 12, wherein the electrode layer comprises Al and is reflective.